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ABSTRACT

The focus of this paper is on the development of telecommunication networking by library and information networks. The word "development" here includes all the processes necessary to broad application and encompasses the necessary social, political, industrial and professional responses to technological advancement as well as technological innovation itself. (Other papers from this conference are available as LI 003360 and LI 003362 through LI 003390). (Author/NH)

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TELECOMMUNICATION NETWORKS FOR LIBRARIES AND INFORMATION SYSTEMS: APPROACHES TO DEVELOPMENT

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TELECOMMUNICATION NETWORKS FOR LIBRARIES AND INFORMATION SYSTEMS: APPROACHES TO DEVELOPMENT

John Bystrom

As this is written, President Richard Nixon signed into law S.1519 creating a National Commission on Libraries and Information Sciences.

Under the statute, which incorporated the major recommendations of the National Advisory Commission on Libraries, the Federal government will begin to provide central direction to the growth of libraries.

At the same time reorganization of Federal telecommunication management affairs, including the establishment of the new Office of Telecommunication Policy in the Executive Office of the President, gives promise of greater central direction to national telecommunication policy.

The opportunity for coordination and leadership has special importance to the development of information networks. It has been stressed repeatedly that to solve the problems standing in the way of network development greater coordination of the many independent Federal efforts is needed. Central planning and management are critical to the ordering of developmental activities which must precede large scale library and information network operation. The 1970 Conference on Interlibrary Communications and Information Networks provides an excellent opportunity to consider how many independent activities, public and private, may contribute to the growing coherency essential to progress.

PURPOSE AND DEFINITIONS

The focus of this paper will be on the development of telecommunication networking by library and information networks. With the word "development" I mean to include all the processes necessary to broad application and to encompass the necessary social, political, industrial and professional responses to technological advancement as well as technological innovation itself.

It is important to stress at the very beginning that telecommunications is a means to an end. Its use is to advance the function of the library. Yet libraries are also a means; their function is to serve the individual by linking him at his choice to stores of information and ideas.

The telecommunication network, as a means, can produce diametrically opposite results depending on the communication system it serves. By linking broadcast stations it limits already limited choices. When applied to libraries, however, the telecommunications network expands choice and the power of the individual. By making available the material of many libraries, networks can enhance individual opportunity. As Dan Lacy has said very well, "The ratio of listeners to one speaker, or readers to one writer, have been astronomically increased by the latest generation of social and technical communications . . .almost alone among the devices of our society in reversing this ratio and linking the single reader or listener or seeker to myriad sources of information, ideas, and inspirations among which he can choose . . .is the library. It is our one major

communication device that deals with an audience as individuals . . ."[1] The purpose for any telecommunication networking of libraries should be to increase the capacity of the individual, to call upon the intellectual resources of the centuries.

During the last year we have seen sharp national debate over the processes by which the network gatekeepers of the mass media select and limit our impression of events. What has not always come out clearly is that mass media inherently selects, and we as users are inevitably limited in the viewpoints which we have available to us.

Our expectations of what libraries can do to counter this tendency can only be modest. Nevertheless the promotion of libraries and their networks represent a tangible way in which government can recognize the right of the individual to have many points of view available.

Before continuing, let me define the term "network" for purposes of this discussion. I hope it is sufficient to use the term in only two ways. Telecommunication network will refer to an operating electrical transmitting system which links two or more points. Telecommunications is defined by the International Telecommunications Union as:

> ". . .any process that enables a correspondent to pass to one or more given correspondents (telegraphy or telephone) or possible correspondents (broadcasting), information of any nature delivered in any usable form (written or printed matter, fixed or moving pictures, words, music, visible or audible signals, signals controlling the function of

mechanisms, etc.) by means of any electro-magnetic system (electrical transmitting by wire, radio transmission, etc.,) or a combination of such systems." [2]

A library or information network refers to a cooperative joining of geographically separated libraries or information systems, using a center for coordination, with the purpose of maintaining a continuing working relationship involving the sharing of information and other joint operations.

The attention to be given to telecommunications does not imply that "wiring together" of libraries is the best available means for transferring information today. The transport of reels, tapes, or films by airmail can be less costly and more effective. The National Education Television Network has used the mails almost exclusively for linking their affiliate stations. The National Library of Medicine finds the mails quite adequate in their exchange with medical library computers in England and Sweden.

Telecommunications are emphasized because their use on any scale will introduce a new set of concerns for libraries and will demand a coherent national development program.

The use of telecommunications is dependent on cost, system capacity, and availability. These factors are influenced by the running interplay between industry, government, and the consumer. The Federal government has highly developed roles and procedures which strongly influence the course of telecommunication system development.

Current use of telecommunications by libraries is relatively small when compared to other users. As a result libraries are in the position

of reacting to and taking advantage of opportunities created for others. A question to be considered is the degree to which, as users of telecommunication networks in the future, libraries should pursue their own course and begin aggressively taking steps to shape a favorable environment for network development.

This paper will examine the telecommunication environment in which library telecommunication networks can develop. The attention of the paper will be on the next several years and on reasonable prospects for accomplishment. The bias is toward action. Long range predictions are avoided.

My plan is to describe some behaviors at Federal, state and local government levels which have affected networking, abstract from this experience elements of special relevance to future development, and conclude with a few proposals for action which build on the short experience thus far.

The point will be made that the development of library telecommunication networks of national scope and importance will require many strategies. Fiscal, industrial, political, and rhetorical strategies will be involved in any comprehensive plan of development, along with the accepted practices for problem-solving using research and application projects.

First let us recognize some of the limitations we face in attempting to relate telecommunications to libraries and their network needs.

LIBRARIES AND TELECOMMUNICATION TRANSMISSION SERVICES

Currently libraries are not very demanding of telecommunications. It is quite possible, it seems to me, that they could remain so. The concepts of role, constituency, and service, and the practices which develop from them may demand only modest increases in telecommunication traffic.

Libraries have been at home with telephone lines. The telephone and the teletypewriter are well suited to their basic processes. Matters are not entirely satisfactory; facsimile communications seem desirable but too costly, and teletype would be used more if costs were reduced. The current network problems of most libraries, however, are met by the existing telephone and teleprocessing systems.

The amount of coordination and cooperation which develops between libraries is one of the key factors in greater demand for telecommunication services. Current status is well covered in conference papers by Casey and by Weber and Lynden. Greater demand will result with the achievement of one of the ultimate goals of a national library plan: "a nationwide system of service which can be responsive to the legitimate demands from a user of one type of library through use of the resources of another library." [3]

Yet a nationwide system can arrive and still the demand on telecommunication transmission may remain small. Demand will depend on the adoption of certain types of terminal equipment not now in use and on something approaching equal treatment for non-print materials. A demand

can also be increased greatly by a serious effort on the part of libraries to reach the general public using electronic means. Networks may be divided for purposes of discussion into those serving institution - institution relationships, both domestic and international, and those serving institution - client relationships. In the materials on library policy I have reviewed there has been much interest in the former: As for the latter, technology to serve researchers has center stage and applications to meet general needs are largely untouched. If telecommunication networks are ever used to deliver knowledge to the general public there will be an entirely new level of demand for transmission services.

When we look at the telecommunication transmission system of the country with escalation of library use in mind, we find capabilities of service to be very uneven. The need for new facilities in both rural and urban is clear. But will new facilities be developed for library use? Not, in my opinion, without a forceful, mission-oriented national program. If one begins to list some of the questions of library policy which make uncertain the future of telecommunication networks for libraries, the size and complexity of the network development problem becomes evident. There are, for example:

--the role of the library in storing and delivering materials in non-print forms?

--the rate and degree to which automation will be adopted?

--the final relationship of the libraries to the independent bibliographic, material handling, and archival efforts of

the disciplines?

--the development and acceptance of national standards of procedure?

--the extent of new public financial support?

--the effectiveness of the new tools and their availability in forms and at costs which will assure use in institutions and homes?

--the resolution of outside constraining factors such as the copyright question?

--the relative utilization by libraries of "off-the shelf" vs. "on-the-line" media delivery systems?

--the role of private industry in the information field?

--and the degree to which libraries show themselves able and willing to attack the geographical and social barriers currently standing in the way of service to many citizens.

While these uncertainties make the nature of library traffic and future requirements for communications difficult to predict, there are equal uncertainties as to the capacities of telecommunications to respond. The telecommunications industry is highly volatile with change effecting change. Library networking will have to conform largely to available transmission facilities and will depend in its growth on the extent to which new telecommunication facilities are constructed for general use. The traffic which libraries have to offer probably is not sufficient in itself to warrant large scale independent telecommunication systems--as is the case in ETV broadcasting for example. This is an important assumption in determining the direction of future library network development

efforts. Equally important is the assumption that new and desirable library practices will require telecommunication transmission capacities not yet constructed.

The pace of technological advance in telecommunications is greater than ever before and faster than in most lines of industry. It has been estimated that 65 percent of the telecommunication products of manufacturing today were introduced in the last decade as compared to 1960 when 35 percent of the available products were introduced in the 1950-60 period. More than 20 percent of current sales appear to be made up of products introduced in the last five years. [4]

The technology on which telecommunication networking is based has produced a series of major innovations. Federal policy which determines the pace and direction of development has been a battleground. In the course of these struggles there have been actions designed to shape communication policy in support of education. Attention has focused on noncommercial television broadcasting for a number of reasons. To date libraries have not seen the need to play an active role.

The capacity of the nation's transmission system for optimum library services is dependent on a number of unpredictables.

--Federal support policies. The extent to which for any of a number of different reasons telecommunication networking is supported by comprehensive Federal intervention?

--Enlightened use of the spectrum. The extent to which library and information systems will be represented and recognized as

valued users of the nation's spectrum supported telecommunications?

--Growth of transmission and switching capacity. The extent to which private capital is turned into new plant and broadband and digital capacities are increased, satellites applied effectively etc.?

--Cost reductions. The extent to which economies of scale and design are passed on--and perhaps even diverted--to library and information systems users?

--User sophistication. The extent to which research and development activities, training programs, and pilot projects are mounted within information and library enterprises?

--Effective marketing. The extent to which industry produces services and equipment which meet library requirements at acceptable costs.

The lists above are by no means definitive, and there is bound to be differences of opinion, especially on matters of readiness, since I am certainly not the one to be making a timely assessment.

The point is that the circumstances necessary for sound application to libraries of telecommunication networks are dependent on conditions determined by a wide range of political, social, industrial, and professional decisions, as well as by technological development.

A major influence on the future will be the extent to which libraries adopt a dynamic posture in order to better succeed in their mission and work aggressively to modify the telecommunication environment created by the policies and practices outside their operations.

A comprehensive approach to the development of library and information networks must have careful planning and firm direction, but at the same time be adaptable and responsive to a sudden turn of events. This should be much easier for librarians to accept than for some others. Libraries are not an independent, tightly-bound system. They are constrained by and must be responsive to their sponsoring organizations; they are dependent on the publishing industry and on abstracting and indexing services from outside. In the case of telecommunications, libraries cannot be passive. Their operating processes are too likely to be shaped by the potentialities of telecommunication networks.

Despite the magnitude of network development there is a point at which all activities meet. That is the doorstep of government--Federal, state, and local. The Federal government has a variety of accepted functions which influence the availability and acceptability of telecommunication services: (1) It is a regulator of interstate telecommunications services through control of the radio spectrum. (2) It is a user of communications which it both leases and owns. (3) It is a promoter of advancement in science and technology and has concern for the flow of information necessary to advancement. (4) In the national interest it supports essential work which cannot be accomplished through the operation of the free market such as the space program, the subsidy of ETV, etc. (5) And it supports R and D activities in telecommunication development and use.

Add to this the involvement in libraries: (1) It operates library

services in a number of forms. (2) It promotes development of libraries and information systems through grants and contracts, and (3) it provides leadership in the development of library policy through planning grants and efforts such as the National Advisory Commission on Libraries. Here is a formidable array of tools to call upon to support any efforts to achieve more effective information services of benefit to individuals and to society.

State governments regulate telecommunication within the state, own and operate telecommunications systems in many instances, and lease services in every instance. They lay claim to a leadership function for libraries, public and private, typically involving regulation and have responsibility for the education system in the state.

Local governments have powers as franchisers of public utilities, which now include telecommunication systems by cable, and are operators of libraries and schools.

At this moment all three levels are deeply involved in decision-making affecting the growth of telecommunication networks, decisions which when projected into the future can be seen to have a direct influence on the basic character of library operations.

In the pages ahead I will describe some of these actions, because the response of libraries to network development must be within the context of what has gone before. Events thus far have turned on issues far removed from the field of information,and libraries have participated very little in the actions. The time has come, in my opinion, when the

purpose of libraries to serve the knowledge needs of the individual will be advanced by an active concern for telecommunications policies and practices.

FEDERAL TELECOMMUNICATION POLICY

So all inclusive is Federal involvement in the subject of this conference that it is difficult to be selective. Each of the proceedings included in the discussion to follow has the potential for favorably influencing the course of library telecommunication network development but is still incomplete. Domestic communication satellite policy retains possibilities for triggering a network demonstration. Educational television is a natural ally and may create precedents useful to libraries. Policies to reduce costs may yet be necessary as a basic condition for large scale networking. And the need for effective scientific and technical communication continues.

National Coordination of Information System Development

Repeatedly over the last several years attention has been directed to the need for coordination at the Federal level if communication technology is to be applied effectively to education and the public services.

Three major national citizen advisory groups have recommended national developmental centers to facilitate the application of systems

technology to the more effective dissemination of knowledge. The conclusions of these committees reflect similar earlier recommendations from professional bodies. In addition, within the Federal government there have been efforts to mount such a coordinating mechanism - to my knowledge in HEW, Commerce, and the Office of Telecommunication Management. These failed in the face of the usual difficulties confronting interagency cooperation. Coming from so many different quarters, the conclusion that there must be a focusing entity to facilitate development of information systems deserves careful consideration.

The three national advisory bodies each reflected different interests and pressures, but each was concerned with the application of technology to the dissemination of knowledge. The President's Task Force on Communications Policy, made up of representatives at the subcabinet level, was initiated in August 1967, and reported in the closing moments of the Johnson Administration. Its function was "to make a comprehensive study of government policy" in the field of communication.[5] The National Advisory Commission on Libraries initiated by Executive order in September 1966, is well-known to the participants of this conference. The Commission on Instructional Technology was a response by the U. S. Office of Education to Title III of the Public Broadcasting Act of 1967. In this act the problems of broadcasting were divided from other systems for distributing educational materials. The main provisions of the act applied to broadcasting, but funds were also provided for a study of the impact on education of nonbroadcast

communication technology with recommendations to Congress for future action.

The President's Task Force on Communications Policy was struck by "the lack of interdisciplinary research into questions of communication policy" and recommended in its report of December 7, 1968, the establishment within government of a "central source of technical and systems advice and assistance in telecommunications." It proposed "greater multi-disciplinary capability within the Executive Branch" to integrate the variety of policies and interest in communication and to initiate "experimental operations" where needed.[6]

The National Advisory Commission on Libraries in one of five major recommendations made to President Johnson on October 15, 1968, proposed a "National Commission on Libraries and Information Science as a continuing Federal planning agency." This proposal became law on July 1970, but the commission was placed in the Executive Office of the President rather than in the Department of Health, Education and Welfare as recommended.

Another of the commission's recommendations was for "establishment of a Federal Institute of Library and Information Science" within HEW. A principal task was to be "the system engineering and technical direction involved in the design and implementation of an integrated national library and information system." Beyond that it was to be concerned with the "changing needs of information users and the effectiveness of libraries and information systems in meeting those needs."[7]

The latter recommendation was viewed with enthusiasm in a report completed in August 1969, by the Commission on Instructional Technology. In addition to endorsing the Federal Institute on Libraries and Information Science, the commission proposed a National Institute of Instructional Technology. This was to be a constituent of what was their principal recommendation, a National Institute of Education. (Also visualized in the report was a Library of Educational Resources "to assist school and college libraries to transform themselves into comprehensive learning centers; and stimulate interconnections among specialized libraries, data banks, schools, and colleges for comprehensive and efficient access to instructional materials and educational management data.")[8]

Additional force was put behind the commission's major recommendation when President Richard Nixon proposed to Congress on March 3, 1970, the creation of a National Institute of Education "as a focus for educational research and experimentation."[9] While this compared to the committee's recommendations it was also similar to a proposal made in October 1968, during the presidential campaign when he called for creation of a National Institute for the Educational Future. The President made no mention of an Institute for Libraries; his use of the singular "institute" may be significant.

The three reports are history. What influence they will exert on the new Office of Telecommunication Policy and the National Commission on Libraries and Information Sciences is to be seen. They stand as evidence of the importance attached to the establishment of a working center for

information systems development. And as I will argue in my conclusion, this deserves the active concern of this conference.

The Communication Satellite

Much of the attention at the Federal level directed to the use of telecommunications in education has been based on Federal interests in space and the hope that the technological innovations of the space program can result in social benefits.

The communication satellite has been viewed as providing an opportunity of breakthrough proportions for the advancement of education throughout the world. The direction of Federal policies toward its application and control has been a battleground for nearly a decade.

Of the favorable characteristics claimed for the communication satellite perhaps the most important is that (1) the factor of distance is separated from the cost of transmission between interconnected points. In addition, (2) the opportunity exists to establish communication with areas of the world previously unserved because of overriding factors of geography, economics or politics. (3) The satellite is adaptable; it can be designed for current special requirements and its short life span assures continuing redesign and adaptation. (4) The limitations of older established systems may be bypassed by direct point-to-point linkage with service centers. Finally, (5) if the circuit demand can be developed to a point approaching capacity, costs per circuit will become very small.

The implications of satellite technology and control to the transfer

of information has been a topic of much study and debate which has focused heavily on its use for television broadcasting. Use of the satellite for educational television attracted wide interest with the proposal of the Ford Foundation in 1966.

The satellite produces pressures to find the traffic necessary to permit the low charges inherent in the system. It has been stated often that it cannot be competitive on low volume routes over, comparatively speaking, short distances. The exact distances and volume have been matters for debate.

The attraction between a television network and communication satellite relay is in the large number of circuits required by television. Furthermore, demand does not have to develop. The broadcasting station or receiving location has a measurable need sufficient to warrant the investment in ground terminal facilities. The circuit demand of libraries, of course, produces no such attraction.

President Johnson focused attention on the use of telecommunication technology for libraries and information systems with several speeches in 1967. At the Conference on World Education at Williamsburg on October 8, 1967, he pictured outstanding library facilities being made available anyplace in the world through development of existing technology. At the signing of the Public Broadcasting Act on November 7, 1967, he looked beyond a broadcasting system to "a great network for knowledge" which would employ "every means of sending and storing information that the individual can use." He pictured an "Electronic Knowledge Bank"

comparable in value to the Federal Reserve Bank.[10]

Little was to be heard in a concrete way until the Networks for Knowledge section was introduced as part of the Higher Education Act of 1968.

In the meantime a President's Task Force on Communications Policy, made up of subcabinet representatives from major departments, was working on a report requested by the President in his message of August 14, 1967, on the "Global Communications System."

One of the top priorities for the task force was to come to grips with the domestic satellite issue and develop a Federal posture which would produce a rapid payoff for the public. Nevertheless, in their report filed at the close of the Administration the task force found that data and experience on which to base recommendations was insufficient.

> "In light of the various unresolved issues. . .we consider it premature to fix domestic satellites into a particular institutional and operational pattern. . .
>
> "The potential benefits of satellites in a domestic setting are not sufficiently comprehended to determine how they might best be shared in the public interest.
>
> "Available data are insufficient to determine the comparative advantages of general purpose vs. specialized system. . ." [11]

They recommended a demonstration satellite program to develop information. Television broadcasting networks were emphasized as potential users, but also the importance of a wide range of purposes was stressed. In

this context the Biomedical Communications Network proposed by the National Library of Medicine was noted.

Policy guidance from the new Administration came January 23, 1970, when Peter Flanigan, assistant to President Nixon, directed a memorandum to Chairman Dean Burch of the Federal Communications Commission setting forth an "open sky" position. It was recommended that essentially no limit be placed on applicants for domestic satellite authorizations. And further,

> "The most immediate potential for domestic satellite communications seems to lie in long distance specialized transmission service - such as one-way distribution of radio and television programs or two-way exchange of high speed data or other wideband signals among thinly dispersed users. Common carriers have informed us that satellites do not appear economic at present for the routine transmission of public message traffic."[12]

Thus emphasis is placed on distance and band width, the strengths of the satellite. The distribution of high speed data as required by a national library and information network receives attention equal to that given the network needs of television broadcasting.

As this is written the Western Union Telegraph Company has submitted an application to the Federal Communications Commission for a domestic satellite system. It is reported that other corporations will follow.

The opportunity which has existed during the last year for pilot

demonstrations in the use of satellites for communication should also be mentioned. The National Aeronautics and Space Administration launched a series of Applications Technology Satellites for purposes of research. ATS-1, the first, was launched in 1966 and is in orbit on the equator over the Pacific Ocean. This satellite was made available in 1969 for telecommunications demonstrations. Contracts for demonstrations have been signed with the Corporation for Public Broadcasting and the State of Alaska. The Lister Hill Center at the National Library of Medicine just announced the first group communication via satellite between four medical centers including the University of Alaska, University of Wisconsin and Stanford University. Voice communication to assist practicing physicians in remote areas was tested and EKG transmissions and slow scan TV are planned.

The University of Hawaii has proposed to NASA that an international consortium of Pacific Basin universities and other educational agencies be interconnected for the exchange of resources in a wide number of areas. Linking of libraries to transmit reference questions by voice with possible use of facsimile is proposed. Scholars in the vast region can benefit by access to the wider collection. Pacific libraries include three which are copyright depositories and national libraries of record for their countries.

A major contract has been signed by NASA with India to allow use of ATS-F, now under construction, for a larger scale demonstration extending at least one year. Originally planned for 1972, the project has just

been deferred a year.

All of these projects are experimental and do not reflect any permanency of use. Actual operations seem modest when considered against the background of reports, offers and other rhetoric on the subject.

The bright promise held out for the communication satellite can hardly be overlooked entirely by the conference. What application of this technological achievement, if any, can be made to the long distance transfer of information?

Educational Television Networks

What I wish to emphasize in discussing educational television is the nature of the campaign. The development of ETV was led by well organized, well financed, central leadership outside government. The development policies were drawn so as to support rather than challenge the motives of private industry. And fear of government influence forced a series of innovative proposals to permit the benefits of Federal financing without the benefits of Federal advice.

Initial encouragement of educational television was in the action of the Federal Communications Commission to "reserve" TV channels for noncommercial broadcasters. The action was supported by the commercial networks and individual stations and was entirely compatible with their economic interests. The effect was to reduce potential commercial competition by removing limited channels from commercial use.

The Ford Foundation became the primary supporter of ETV broadcast

development. The foundation's total contribution is over $100 million and far exceeds all Federal financial assistance combined. The foundation saw a special benefit in national networking and was the major backer of a central network organization, the National Television Network (NET). Thus ETV had strong central leadership outside government from the beginning.

Federal support for construction of stations was authorized in 1962 under the Educational Television Facilities Act. The prompt use of television channels for noncommercial purposes was primary. While funds for network interconnections were allowed, in fact there were inhibitions to such grants. Action again was compatible with the economic interests of private industry. The act reflected the fear of government control of content. It provided funds for equipment only and specifically stated that there wouldbe no government interference in programs.

The fear of Federal influence has been an important factor in the strategy directed to achieving a network. An ETV network differs importantly from proposed library telecommunication networks in that it produces programs and decides what viewers will see.

In 1966 a citizen's commission was funded by the Carnegie Corporation of New York to study educational television and provide recommendations for future development. In their report the Carnegie Commission on Educational Television recommended establishment of a "private corporation" to be supported by Federal funds. It was to be "insulated" from government influence by a financial mechanism which involved a tax on

the sale of new TV receivers. The sums raised were to be placed in a dedicated fund and made available to the corporation without annual appropriation by Congress.

The corporation itself was prevented from exercising undue central control by restrictions on its capacity to operate facilities or produce programs. It was prevented from operating a network.

The Public Broadcasting Act of 1967 authorizing the corporation was passed quickly, supported by everyone including commercial broadcasters. To aid in passage of the bill the insulating mechanism for financing was not included, however, and the corporation today operates on an annual appropriation basis.

Currently the Corporation for Public Broadcasting is moving ahead forcefully to develop a broadcast network with unique features, but as yet a steady-state telecommunication network operation is incomplete.

In shaping aspirations for library telecommunication networks it is worth recalling that it has taken fifteen years of determined effort to achieve a "real time" or "live" ETV network without direct Federal participation and support. Like the library, the ETV broadcast station lacks a market economy on which to base development. The alternative to the marketplace in the United States is the taxpayer or a foundation.

The problem for the ETV network was the high cost. So high were the costs that there seemed only one source of support, the Federal government, and its control over programs was feared. The Carnegie Commission estimated the cost of national interconnecting of state

networks -- assuming they existed in each state which was not the case -- at $9 million annually for leased services from common carrier. If operator-owned, a capital cost of $30 million and an annual cost of $6 million would be required.

The Carnegie Commission recommended free or low cost rates for ETV interconnection. A provision to encourage the Federal Communications Commission to allow such rates was included in the Public Broadcasting Act. This represented one answer.

A second alternative was that contained in the Ford Foundation offer of August 1966, in which it was proposed to establish a private satellite corporation to be capitalized by the Ford Foundation. It would lease interconnection services to the three commercial networks and provide channels for an ETV broadcast network. Channels were also to be made available to elementary, secondary, and higher education. In addition $31 million was to be provided for ETV broadcast programs from the difference in network operating costs and the amount to be charged the three commercial networks.

The originator of the idea of free interconnection for ETV, interestingly, was the American Broadcasting Company who had petitioned the Federal Communications Commission for authority to operate a satellite for interconnection of their affiliated stations and had promised free interconnection service and some dollar subsidy to the ETV network. The Ford proposal was in the form of comments to the Federal Communications Commission in response to the ABC request.

The Ford Foundation justified its plan on a principle which can be traced to the administration of Theodore Roosevelt. The Conservation Movement born during his administration was built on the principle that those who profit from use of resources owned by the people should provide a return to the people. The foundation used the language of a leader in that movement, Senator George Norris, when it declared that the taxpayer who had financed satellite research should receive a "people's dividend" in the form of educational television network programs.

The search for ETV resources has produced a Corporation for Public Broadcasting, statutory authority to undergird negotiations for low transmission rates, and a dynamic idea which still may be used by a government serious about recasting national priorities. While ETV networks and library networks are far from analogous, the contributions to public policy made by the former may be helpful to development of the latter.

Rate Reductions

A principal deterrent to ETV networking is the cost of interconnections. Eventually in the implementation of library telecommunication networks the problem takes on the same character, raising funds and reducing costs.

Efforts at the Federal level to secure rate benefits have taken three forms.

Free or reduced rates for education have been advocated with limited success. Through the ratemaking process the government is in a position

to provide special benefits to educational users in the public interest. The effect is to subsidize a high priority function. Costs of transmissions are shifted from favored users to non-favored users, just as post office book rates pass the burden to the general taxpayer or other users. Claims for educational advantages have been made on the basis of fair return to the taxpayer for profit producing benefits provided private industry.

A second form of rate benefit is that negotiated by the government as an administrator. Bulk rates made possible through large traffic volume have served to greatly reduce unit costs.

Third, the government operates or leases systems. Military, space research, transportation, law enforcement and other recognized Federal functions use government operated or leased dedicated systems. There have been no dedicated systems in education, a primary function of the states. It is worth considering, however, that since the establishment of the Library of Congress, the Federal government has had library and information functions. Furthermore, information transfer may be accomplished in support of many purposes including those in which the Federal role is primary.

First let us consider the opportunities existing for reduced rates. The policy of the Federal Communications Commission in connection with common carrier charges in interstate commerce has been equal rates for equal service to all comers. Bookies or scholars are treated equally; put a little less cavalierly, no class of subscriber is assessed charges

which subsidize another class of subscriber.

The Public Broadcasting Act of 1967 sought to modify the policy. The Federal Communications Commission was authorized to approve free or low cost rates for the interconnection of noncommercial education television stations. With the activation of the Corporation for Public Broadcasting negotiations involving the corporation, American Telephone and Telegraph and the Federal Communications Commission have produced reduced charges for network interconnection of public television stations.

A provision authorizing the Federal Communications Commission to approve free or low cost rates for interconnection of institutions of higher education was later included in the Higher Education Act of 1968. The language was not a part of the original higher education bill in which the U. S. Office of Education staff had hastily inserted a Networks for Knowledge provision. It was added later on amendment of Senator Wayne Morse and passed with the bill. Although several years have gone by, to my knowledge no college or university has made use of this provision for interconnection costs. Yet the provision applies to all those eligible for support under the section.

The principle of fair public return for benefits conferred has been introduced into the developing struggle over public policy for urban cable systems. Free channels for public use have been advanced as one of the necessary requirements for franchises. The power of the Federal Communications Commission to protect the public interest is a potential force for providing what in effect are reduced rates.

Second, as a major user of telecommunications the Federal government enjoys rate advantages which could be used under some circumstances for library networks. Attention is not given always to these available advantages. For example, state governments have been eligible in most instances for Federal Telpak arrangements. Yet three years ago when the U. S. Office of Telecommunication Management reviewed state leased facilities they found that twenty-seven states were contracting for services at a commercial rate averaging about $4.00 per month per voice channel mile, while nineteen states were using state Telpak rates ranging from $1.00 to $1.50. Only twelve states utilized Federal Telpak rates averaging forty cents per month per voice channel mile.

In some instances where Federal rate advantages could be very helpful they cannot be used. Demonstrations supported by Federal grants involving networks are not eligible, for example. This has proven a major deterrent to the funding of experiments involving telecommunication applications. I know of one proposed project in which the projected line charges exceeded the several millions of dollars allocated for all research in that educational program category. This limitation is not in the interest of the government, education or industry.

Third, if we are serious about networking we need to review the possibilities of utilizing the Federal government's telecommunication services and systems. There is, of course, the FTS system, the basic government long-distance telephone system. Of special interest to libraries in their present state of readiness is the Advanced Record

System developed by the General Service Administration and operated under contract by Western Union. The ARS was designed to interconnect not only conventional teleprinter (narrow band) subscriber stations but all known varieties of high speed terminal devices requiring broadband transmission facilities. The system is capable of forwarding traffic to Western Union's TELEX and the Bell System TWX, of exchange traffic with AUTODIN of the Department of Defense, and of refile to the Western Union Public Message System.

The various Federal rate and systems advantages might be captured under a plan by which one or all of the national libraries served as agents for a network of constituent or affiliated libraries.

Certainly a comprehensive approach to networking will involve concern for costs as well as appropriations. Good housekeepers will demand a careful study of the existing rate advantages for libraries. Statesmen will provide some assistance to those who are seeking to open up the telecommunication systems of the country for educational uses.

Scientific and Technological Information

There has not been the question concerning Federal involvement in science that has existed with respect to the Federal role in education. This has its effect on informatior networks.

It has been generally accepted that under the American system of distribution of powers the promotion of libraries is grouped with authority for education and is reserved to the states, with the exception

of library functions which are an extension of some recognized Federal function. Up until recent years any Federal interest in information has been based on some accepted Federal power. Science and technology has benefited from the link with defense and industry.

When in 1968, President Johnson repeatedly expressed his belief in the ability of networks to distribute knowledge and improve the human condition, it was suspected by some that the words were a reflection of the long time interest in information shown by the Office of Science and Technology in the Executive Office of the President.

Whatever the truth, the Office of Science and Technology has a history of concern for information flow in general and networks in particular. The Federal government is a major supporter of science. The success with which it meets many of its responsibilities is dependent on the products of science and technology, and information has a vital role in developing those products.

In 1962 the Committee on Scientific and Technical Information (COSATI) was organized within the Federal Council for Science and Technology. Made up of representatives from Federal information activities, it has focused on improvements in handling scientific and technical information in the government and on development of information systems to store and circulate scientific and technical information to practitioners.

The interest of the Office of Science and Technology encouraged a series of reports to advance solutions. Their titles express the direction of proposed action: "A National Scientific and Technological Information

System" (Management Technology Inc. - 1963), "A National Plan for Science Abstracting and Indexing Services" (Robert Heller Associates 1963), "Proposal for the Establishment of a Government Corporation to Create and Provide Services for an Integrated Store of Scientific and Technical Information" (Mortimer Taube - 1963), "A Pentegon of U.S. Scientific and Technical Information and Data Services" (G.S. Simpson, Jr. - 1963), "Memorandum on a National Library of Science System" (Stafford Warren - 1963), "A Model Information Retrieval Network for Government, Science, and Industry" (Jonker Plan - 1964), "Toward a National Technical Information System" (Air Force Office of Aerospace Research - 1965).

Among the most influential of these studies was the Baker Report (1958) on "Improving the Availability of Scientific and Technical Information in the United States" which made recommendations for stimulating nationwide activities in publication, data centers, unpublished research information, storage and retrieval, and mechanical translation. Three later reports received good attention within government circles: The Crawford Report (1962) on "Scientific and Technological Communication in the Government," recommended improvements in scientific information, a plan for orderly transition to new systems and problems associated with restrictions on flow of information; The Weinberg Report (1963) on "Science, Government and Information" discussed problems of the information transfer chain and information systems and suggestions for action by the scientific and technical community and by government agencies; and the report of the Systems Development Corporation (1965) on a "National Document Handling

Systems in Science and Technology" provided guidelines for coordination, non-duplicative development of Federal information activities.

The problem brought on by the rapid increase in amounts of information has been under attack from both the U.S. Office of Education and the National Science Foundation. Grant awards of the two agencies reveal a strong interest in efforts to retrieve and make available the report products of research. The importance attached to networking has increased with the rise of the computer and the recognition that the decentralized system under development for the retrieval of information was difficult to query.

Over the last decade the National Science Foundation has committed large resources to increase and decentralize sources of basic information in the scientific disciplines. Abstracting and indexing services have been supported in chemistry, physics, biology, the earth and environmental sciences, mathematics and others. The application of the computer has been vigorously promoted as a necessary tool.

The U.S. Office of Education has been involved in broadening information retrieval activity also. The Educational Research Information Center (ERIC) was expanded in 1964 and soon comprised nineteen regional centers including one on library and information sciences at the University of Minnesota.

An example of the involvement of the disciplines in information retrieval is the Council of Social Science Data Archives. There are approximately 25 member organizations in the Council, each active in

gathering data. Computer development and telecommunications are among the council's major concerns.

A problem that has become apparent is the need for access by the scientist on the university campus where the library is not linked to appropriate computerized information systems. Both the National Science Foundation and USOE have shown concern for the problem. It has appeared to some that any science information network would have to be linked eventually to a university library network if it were to perform effectively. A number of proposals for funding have sought to test the extent to which a discipline-centered information service could be used by a broader public when made available through a general library.

Both the National Science Foundation and the U.S. Office of Education have supported the development of networks on a planned or prototype basis. The requests for such support are greatly in excess of the funds available. Thus administrators are faced with the problems of selecting unique applications in order that Rand D funds will not be diverted to routine support.

The Library of Congress has voiced concern over efforts directed to producing an independent science information network. Much of the planning has assumed separation of scientific and technical information from the general body of knowledge. The plan of the Systems Development Corporation, for example, visualized a network for scientific and technological information involving the Federal departments but no mention was made of the Library of Congress.

The Library of Congress position as set forth in its paper for the National Advisory Commission on Libraries took issue with this approach. Science and technology the library staff said in Libraries at Large is not a definable area for which a network could be constructed. Although recognizing the Federal interest in the status of science and technology it was suggested that other branches of knowledge -- law, the arts, the humanities, and the social sciences -- should not be overwhelmed by that interest.

A comparable division can be noted in conversations on political strategies for development. One point of view sees the science network as the pace setter, breaking ground for comprehensive network development. There is the opposite view that says as many interests as possible should be included in the developmental package to increase the base of support and thus the chance for implementation.

The future of networks for science and technology cannot be foreseen. The time is not far away when the technical potential will exist for networking at reasonable cost and pressures created by investments in the collection and storing of data will be greater. A national plan is needed which will be accepted generally as the one to best serve both individuals needs and the national interest.

THE STATE AND TELECOMMUNICATION NETWORK DEVELOPMENT

State telecommunication networks are growing in variety. Some are owned and operated by government, some are leased systems, and some use regular common carrier services. They assist many kinds of public activities, including education, law enforcement, forest protection, highway safety, public health, and disaster control.

Growth in the last decade has been influenced by demands which include: promotion of greater efficiency and effectiveness in government services, interconnections of educational television stations, sharing of services between related institutions, the development of emergency and backup telecommunication systems to increase disaster protection.

What benefits can libraries obtain from these state telecommunication activities? The hope is expressed on occasion that existing state telecommunications can be utilized by libraries in their networking efforts.

State library networking can be envisaged as a necessary part of a future state library system. Telecommunications can be essential to the operation of a state library plan where there is differentiation of function or sharing of materials. A state telecommunications network can be the key to plans for extending services to the less populated areas and for expanding functions as might be required by the concept of a community information center.

State information networks have been viewed in two ways. As a primary system for the state or region it has its own identity and is responsive

to demands from within the state, both institutional and citizen. It has also been viewed as a node or regional center of a national system, retransmitting to local points.

State telecommunications operations are by now sufficiently well established in many states so as to warrant consideration in planning of library networks and information systems. However, there is no certainty that they can be of use.

Three kinds of state network development have relevance. (1) Efforts are being made in some states to develop statewide telecommunication management,with a backbone network for all kinds of administrative purposes. (2) Educational television stations have been interconnected into network arrangements in nearly half of the states. (3) Health and education institutions are interconnecting by means of telecommunications for the sharing of services. Each of these trends will be discussed briefly.

Over the last five years there has been a movement to create central state telecommunication authorities sometimes headed by appointed commissions. The State of Nebraska is a leading example. It has a strong central management group and a state telecommunication board. Illinois, Iowa, Massachusetts and California are also examples.

A review of a number of statewide telecommunication plans reveals little input from libraries. There are a number of reasons that can be suggested. Libraries with their Telex and telephone have seen little to gain immediately from state networks. Often state planning has

depended for funding on the Office of Civil Defense; for this reason emergency communication has been a prime objective. And state agencies already operating statewide systems, such as police, forestry, or roads, have a direct, immediate interest and the trained staff to support this interest.

There are basic pressures which may encourage libraries to use state telecommunication systems when they exist. It is argued that joint use of communication systems by many agencies is more effective and less costly. In the words of one state study, "In order to obtain the greatest economic efficiency for a microwave system it is necessary to carry as much information, communication and data as possible. Statewide coordination between departments and agencies is mandatory if costs are to be kept in bounds."[13]

The state ETV network also represents a possible resource. The first state ETV network was started in Alabama in 1955. They are now the national pattern. Multi-station ETV network systems are operating in twenty-one states and in six states funds have been acquired and committed for development. Of the 190 ETV stations, 60 percent are licensed to state systems. States without ETV networking are found in the sparsely populated areas of the Rocky Mountains and Great Plains.

State ETV systems may eventually serve as the basis for the development of educational telecommunication networks in some states. As was pointed out in a telecommunication study for the State of Illinois,

"With the addition of the proper terminal equipment,

> an ETV network, because of its wide frequency band characteristics, can easily accomodate the other types of narrow band educational transmissions such as slow-scan video, high fidelity audio, telephone quality audio, teleprinter and digital data, and distribution of educational radio network programs."[14]

One possible course of development is to have two major networks, a state administrative network and an educational network, each administered separately.

In other states the ETV network and the state administrative network may be developed together. The Illinois study concluded that under some circumstances this will be better economics.

A third type of development is the linking of particular classes of institutions. The interconnection of health and education operations for purposes of sharing services and materials continues to move forward. The first interconnection of institutions of higher education was in Texas in 1961 in a project (TEMP) assisted by Title VII of the National Defense Education Act. There are now six major developing educational networks in the state.

Educational computer networks involving interstate interconnections as well as intrastate links are expanding very rapidly.

Teletypewriter networks for library systems are, of course, becoming commonplace.

There is a steady growth in interconnections linking industrial plants

and offices to university centers. In one instance, Stanford University, this involves the over-the-air 2500 Mhz service licensed by the Federal Communications Commission, but for the most part common carrier services are used.

The interconnection of medical and health centers for television exchange, sometimes two-way, has been growing. With strong support at the Federal level the future of medical library networks seems assured.

While much of this activity is occurring in the larger industrial states it is also true that some sparsely populated states have been able to mount networks, seeing it as a way to extend services outward from major centers of population. The national picture is changing constantly and an up-to-date report isn't possible. The vicissitudes of development, furthermore, make it difficult to divide aspirations from operations.

Network development has been encouraged by seed money made available under Federal programs. But in many instances action represents a judgement that institutional objectives warrant network support out of regular resources and can be justified in the operating budget.

These telecommunication interconnections will grow, undoubtedly, as new health and education institutions are opened to serve an expanding and more demanding population. Benefits to libraries will be judged ad hoc by local management with professional associations playing an important role in the dissemination of experience.

The strong likelihood that in a substantial number of states the

link-up of what is now a few health or education centers will eventually result in a comprehensive statewide educational network service should be recognized in any national strategy for library network development.

On the basis of the limited state experience thus far it is possible to hazard a guess about future directions: (1) Special purpose telecommunication networks will be activated within the state for a variety of objectives depending on social appeal, local leadership, and Federal participation. (2) The pressures for more sophisticated uses and for economy of operations will result in a grouping of needs and central planning of facilities, either owned or leased. (3) Libraries will not in most cases operate complete systems. They will work instead with state telecommunication entities. (4) The communication needs of libraries will be small initially. However, the availability of network capability will be an incentive for thinking in terms of a statewide system and also will encourage expanded non-print services. New methods will result for extending services to the general public, to researchers, and to government and industry.

There are several observations to be made about the current level of state telecommunications. First, development varies greatly from state to state. Any effort has an uncertain future which seeks to develop a national network on the basis of linking existing state networks. Second, network development takes time. Work in developing the Nebraska central telecommunication system extended over five years. Usually it takes longer. The Ohio legislature this year voted funds

for a state ETV network, culminating over ten years of continuing effort by strong dedicated leadership. It seems unrealistic to expect general application of state telecommunication networks during the '70s. Third, no one has yet determined how national network standards can be gracefully yet rigorously imposed on independent state operations. Private common carrier history suggests the difficulty of maintaining transmission standards without strong central control. Experiences in the development of a national law enforcement network as well as civil defense efforts deserve the attention of developers of national library telecommunications. Fourth, the planning and activation of state telecommunication services have tended to support purposes for which Federal assistance and leadership are available. Thus when state telecommunication networks for libraries are viewed as part of a national system, it seems evident that only strong Federal incentives and a pretty firmly directed program can produce the uniformity necessary to units in a Federal network.

Yet there is a basis in present development for pilot demonstrations of statewide information networks. In selected states there is the capacity for statewide relay of the signals as part of a prototype national system. Where national library network plans benefit from high social priorities, as could be the case with a National Medical Communication System, a prototype national service could supply information over interstate links to some states, to be retransmitted over statewide systems to points of need. In some states the telecommunication

potential exists for projects of the Educom type, in which a statewide network of colleges and universities is linked with national libraries.

Furthermore, there are the telecommunication resources in a few states to allow for state pilot projects in extending public library services.

Libraries must be prepared to exploit opportunities as they develop. State telecommunication development thus far reflects the principle that networks are shaped by the functional demands of the users. Libraries should be able to speak with sufficient authority about their needs to be an influence on the structure of telecommunication systems.

There is the question also of how statewide telecommunications will be used to bring better service to more users. Is state library organization and planning sufficiently strong and coherent to create a purpose for state library networks? Weber and Lynden point to only three states -- Hawaii, New York, and Pennsylvania -- with strong library systems involving centralization of key functions.

Beyond interlibrary loans, centralized reference and copy transmission, all on a relatively small scale, there are few uses for state telecommunication networks which would not be disputed by working librarians on practical grounds. Experience to date does not provide a persuasive basis for risky attempts at massive restructuring of old institutions currently performing functions which the public understands. A carefully programmed effort needs to be considered to encourage conceptualization and testing on libraries of new practical methods for distributing information to the public utilizing telecommunication.

MUNICIPALITIES AND THE CABLE SYSTEM

High capacity cable systems have passed out of the state of technological innovation and are about to be introduced into operating urban society. We are in a period of political and economic innovation. The future position of libraries and information systems in relation to these telecommunication services, along with man's future access to information, is being determined in the process.

The "wired city" concept has appeared in the context of an extension of existing community antenna television service (CATV). This conceals its importance for information systems and libraries, and a distinction should be drawn between two kinds of systems. The CATV system typically has twelve channels for one-way delivery of television programs to home TV receivers. It is both a transmission system and a program service and lacks the versatility expected of the future urban cable transmission system. It is tied in purpose to the delivery of commercial television programs; other uses are incidental to that purpose.

The hypothetical "wired city" system has many purposes, most of them potential. It represents in concept an effort to exploit fully the increased coaxial cable capacity which technology has made available. Cable systems using present technology are potentially capable of about thirty TV channels. It has been stated as practical to extend the range to fifty TV channels. The Electronic Industry Association visualizes a duel communication system in our cities involving fifty channels with

two-way facilities, limited switching, and capability for communication by sound, pictures, data and facsimile. The opportunity this would open up for information transfer is obvious.

The limited application of high capacity cable telecommunication systems to large centers of population is a matter of cost. The President's Task Force on Communication Policy concluded that application of cable telecommunications to the nation as a whole was financially out of the question. It has been estimated that capital outlay for systems serving New York City alone will exceed one billion dollars.

The probability that urban areas will be served by broadband, versatile cable transmission systems puts before libraries basic questions of institutional character and function. In adapting to this telecommunication development, libraries could become different institutions.

Most of the new tools for the home, such as facsimile recorders, high speed coders and stored television displays, require the high capacity cable systems to be available sometime in the future. This quotation from the presentation of the Electronic Industry Association to the Federal Communications Commission provides a flavor of things to come.

> "With such a service available [electronic home library service] a reader can request a book or periodical from a large central library, using a narrow-band channel to the library. The desired book is then transmitted from micro-fiche, microfilm or videotape, page by page,

and received via the . . .network.

"Several modes of operation are possible. In one, the entire book or selected article is transmitted at the maximum reception speed of the user's facsimile recorder. . .

"As an alternative, a soft-copy display can be used. Each page is transmitted and stored at the receiver for reading. When the reader has finished one page, he signals for the next page, and this is transmitted in a small fraction of a second with no perceptible delay. . .

"To get a feeling for the capacity of a broad-band channel, it is of interest to note that in the demonstration described. . .the entire text of Gone With the Wind was transmitted in facsimile over a television microwave circuit in slightly over two minutes."[15]

The growth of urban cable service is now heavily dependent on the decision-making processes of municipal government within conditions set by the Federal Communications Commission. This, and the requirements for raising investment capital, are shaping networks which have the potential of linking libraries and information centers to the home and place of business.

New York City provides a picture of the difficulties in regulating a

new technology. It is presently considering the requests of two CATV companies for twenty year franchises. The access to such systems which libraries will enjoy is to be determined largely by government regulatory action. Thus it is important that libraries are capable of bringing to focus their future requirements at those moments when government regulatory policies and practices are set.

A Mayor's Advisory Task Force on CATV and Telecommunications in New York suggested guide lines which included the recommendation that a portion of the channels be made available free. Of seventeen channels, eleven would be used for television broadcast station programs, two would be available to the city for government services, and two more would be "public channels" leased to community groups.

Last July hearings on the two franchises were held by the Board of Estimate. It was protested that a twenty year lease locked the network into existing technology. And it should be added here that it is equally important from the standpoint of libraries that the network is locked into existing forms of use.

Only one-way transmission is proposed. The tax benefits to the city will be substantial, providing an argument for prompt approval. Those who propose delay in the form of a short-term extension on the existing agreement point to the importance of applying the most modern technology at the beginning. They note that elsewhere forty channel systems are being installed and refer to the importance of multipurpose two-way capacity rather than a one-way TV system.

Issues which seem of concern to libraries are these: increased number of channels, two-way capacity, terms of the franchise, free use by favored public users, methods of financing, and delay in decision to allow for long-range studies of potential utilization.

Parenthetically, the Federal Communications Commission has stated that it plans to require that the new system be designed to accomodate two-way communications for those subscribers who want them.

After a look at advances in cable technology, the U.S. Office of Telecommunication Management concluded that it is "not clear. . .just how broadband local distribution systems are likely to develop."[16] Government decisions over the next several years will do much to shape the future. Much interest has been expressed recently. It is reported that the Ford Foundation will launch a new cable task force. The Rand Corporation is currently undertaking a cable study under a Ford contract. Stanford Research Institute is preparing a major report on cable communications in urban centers, and the Alfred Sloan Foundation has just announced a task force on the study of cable communications in the city. What is the role of libraries at this time in the face of what are obviously many unanswered questions?

The limited use made by libraries of the existing 2,300 CATV systems raises questions as to future library participation in a high capacity, two-way cable system.

Today's CATV operator has a positive incentive to offer a variety of programs and, unlike the broadcaster, has sufficient channels to seek

to appeal to minority tastes. Where can one get the programs to fill twelve or twenty channels? There is an existing opportunity for a public library program service. Academic meetings such as the general proceedings of the annual convention of the American Association for the Advancement of Science have been programmed on public broadcasting stations; uncopyrighted government and archival films can be displayed; the children story hour and other regular parts of the library service can be distributed; even the Library of Congress's recorded books for the blind might be offered.

It is my impression that despite existing opportunities the uses of CATV systems by libraries have been small. There is the question of how such programming fits into library objectives and functions. But also, the question of readiness is raised. How prepared are libraries to take advantage of the service extension opportunities provided by cable systems?

With the emergence of the "wired city" the libraries have two directions of action to consider. One is to determine what uses if any the old institution willmake of the new. This will require planned study and pilot demonstrations to be properly carried forward. The second is the mounting of strategic and tactical responses to help assure cable systems which will perform effectively in serving library and other information retrieval functions.

The broad position on which the case for libraries rests has been well stated by Sidney Dean. "A metropolis without open communication

channels and media cannot function as a market economy, a free society, or a self-governing polity."[17]

It would be fortunate if the future use of urban cable services had been fully thought out today. A national library strategy could be helpful at a time when the decisions are being made which determine the specifications and the purposes for which the new systems will be used. However, there is little concrete experience on which to base estimates of future library use. In fact, no assurance can be given that libraries will use the cable systems at all.

Nevertheless, it is possible at this stage to determine the qualities of a cable system which open up communication and allow a place for libraries and other as yet undeveloped information systems. Specifications which best serve libraries can be reasoned from the technical and economic character of the system. For example, libraries cannot engage in economic competition for channels against profit-making industry. Library use will depend on regulatory concessions made to them as a favored user. Concessions will come most easily if the channels are large in number and readily accessible. Libraries are best served by the cable systems with the largest number of channels. Also systems that provide for two-way communication rather than one-way are necessary to information exchange. Systems that are capable of interconnection with other systems and are suited to all kinds of terminal equipment are better than systems that are not. Characteristics desirable for free and rapid transfer of information can determine a national library posture.

At the same time, a clear and convincing picture of the use which libraries and information services will make of the new cable sys ems is needed. Innovations necessary to the exploitation of future telecommunication capability require the involvement of library management. Predictions must eventually face the rigors of application, with the tests of cost, public acceptance, and operating feasibility.

Pilot projects may be needed which would utilize the most advanced of the existing cable systems. However, the movement of events is such that public policy toward urban cable systems is likely to be determined before the results of such pilot projects come in. The economic base for the new industry will be laid and capital raised on the basis of market methods already formulated. Libraries will stand with hat in hand alongside other educational users who lack the financial bargaining power of an industry in search of markets. The system will be so firmly rooted as to be all but unchangeable.

Politics and economics will determine development of cable systems and may foreclose the future. The plan and manner in which the library position is advocated deserves attention now. Restrictions on active participation in political decision-making, real and customary, need to be faced and methods found for surmounting them.

The future is also dependent on innovation in utilization. This is a primary responsibility of the library professional, one he cannot meet effectively without the assistance of many disciplines but one that is primarily his task to perform. There is a long road between the forecasts

of the future and the practices of the present.

Development requires both a prepared case and a social mechanism to bring argument to bear upon the centers of decision.

SOME PROPOSALS FOR TODAY AND THE NEAR FUTURE

If there is an overriding lesson in the several lines of action just described, in my opinion it is this: The widely-dispersed library and information activities of the country are not organized to develop a comprehensive national network system involving telecommunications and automation. The central mechanisms required to control essential conditions are lacking. Despite the advances of the last year, there remains a need for coordination and subordination to common purposes which will require a number of years to evolve.

The National Commission on Libraries and Information Systems will provide a focal point for leadership. Yet I think we should recognize that its impact cannot be felt for several years.

The recent action certainly is not intended to provide a basic organization for the implementation and management of a national system of networks. The use of an appointive commission in the Executive Office of the President to operate a network system is out of the question. There have been suggestions for the management of a network system, but no single plan of organization is acceptable to even a substantial minority in the profession.

We are also without a central approach to research. The national institute suggested by the National Advisory Committee on Libraries has not been created to provide for long-range coordination of the research and development required before there can be networks on a large scale.

Really, we are without a plan for national network development. There have been proposals for pieces of a system. But without a broader framework there is uneasiness as to the effect which implementation of a part will have on efforts to deal with the whole. Specifically, if the needs of the academically elite are served, will it set back efforts to meet the information needs of the general public?

There has been almost no effort to grapple with the problem of financing. The costs not only of telecommunication network operations are involved but also the increased cost of library operations resulting from improved access to materials.

There is as yet no library strategy for the development and use of statewide telecommunication systems and urban cable systems or for international exchange by satellite. The use to which libraries will put these telecommunication systems is a matter of conjecture.

And there is no continuing effort to modify the telecommunication environment for the purpose of extending access to materials through working networks. Libraries are inhibited from being as effective as they might be for many reasons.

In these final pages a number of actions are proposed with two purposes in mind: to develop a capacity for central planning and

operation without interfering with the essential independence of separate institutions and without subordinating libraries to a line organization, and second, to respond to the rapid changes in telecommunications in a way that is advantageous to information network growth.

A Public Corporation (1)

In the '30s the government used the corporation to open up the supply of financial capital; in the '60s it used the corporation to open up communication. On three separate occasions the corporation has been established to facilitate application of new communication technology to the needs of society:

-- Communication Satellite Corporation authorized in 1962,

-- Corporation for Public Broadcasting authorized in 1967,

-- 1970, a private corporation to take over the U.S. Post Office Department was approved.

It seems to me that a fourth entry is a likely possibility:

-- Information Transfer Corporation authorized in 1976.

The public corporation is proposed here in the hope that it will stimulate analysis of the basic problem. Obviously it has not been given the thought it requires. Yet only a limited number of approaches to the operation of a national network are available. There is the consortium of users, operation by a national government agency, a special service offered by private industry, and the public corporation.

The basic questions which lead to the selection of the corporation form are: Will network functions be managed inside or outside the Federal government? And will networks be created by a variety of ad hoc arrangements or be the product of central management and design?

The primary function of the corporation would be to arrange for the storage and transfer of information. It becomes a method for channeling public funds into information development. Supported by Federal appropriations it would be able to make payments to institutions for the storage of information used and to copyright holders for the use of information. Its relationships would be with libraries and information storage agencies. It would not become involved in statewide distribution or with urban cable systems. Yet because of its central position it could assure the compatibility of telecommunication systems. The corporation could provide for high unit efficiency, for it would negotiate bulk rates with private industry for telecommunication and computer services. The major objective would be to increase equal opportunity for information by facilitating the work of libraries.

In its action creating corporations the Federal government has each time recognized the importance to society of open channels for communication. The Corporation for Public Broadcasting increased the still limited number of broadcast program choices. The venerable U.S. Post Office Department was faulted because it could not adapt to technological innovation. In neither case could the free market be relied on to produce the service. In both instances the public corporation was used to avoid the restrictive

practices of government administration.

An information transfer corporation would also escape the constraints which are imposed on government operations. I refer to the fiscal and personnel practices, statutory and policy limitations, and constant time-consuming review. It would be free to act wherever the problems occurred -- national, state or local. Particularly important, it could operate outside the United States with the freedom of any industrial corporation. It would be a force in providing visibility and identity to libraries, not as a part of some host institution but as an independent activity determined to preserve and extend the individual right to information. And it would allow for concentration. If this activity were part of a department of government or a national library it would have to bow to the agency's statutory and policy limitations and march in some degree to the tune of a multipurpose organization.

Because it can collect demand, the corporation becomes a management tool by which library telecommunication requirements can be determined. New uses can be studied and predicted. Industry receives the information needed to warrant investment in response. The corporation is a means by which technological innovations can be introduced into library services.

A corporation makes it possible to plan and mount a general system. It provides central control and the vital power to enforce system standards. This may be accomplished by little more than a contract with a common carrier. But a corporation also has the capability to utilize alternatives: operate a totally owned system using government spectrum

space, lease a special designed service from a communications company, use a federally operated communications service through a national library facility and others. It can join with other major entities such as the Corporation for Public Broadcasting in joint use of services.

A corporation can exploit to advantage the opportunities afforded by regulation of the radio spectrum. Currently industrial applicants to the Federal Communications Commission for privileged use of the spectrum have been able to provide only token assurances of public service uses, with the very notable exception of industrial offers made to educational television. A corporation could negotiate with industrial corporations as they prepared applications to the Federal Communications Commission, a very timely moment.

The information transfer corporation is not possible for perhaps five years. We have to learn more about costs and about benefits and foundation support will be necessary for the study. Conceptualization, professional acceptance and congressional action all require time. I refer to the experience of the Corporation for Public Broadcasting. A year was spent in developing the interest of the government and the profession; the Carnegie Commission required something over a year and Congress something less. The first appropriation came well over four years after the campaign began. I think in this case it would take longer.

But there is not much reason for concern over the delay. The time to treat a national network with the seriousness a corporation implies hasn't arrived. A telecommunications network will not operate until such

time as a standard record had been developed and received acceptance along with a universal language for an automated bibliographical control system. The Library of Congress looks to sometime in 1972 or later for this product. Nevertheless, the ETV experience indicates that if we are interested in an operating national telecommunication network for libraries during this decade it is not too early to begin organized study of ways and means.

In the intervening period the momentum of network development should not be allowed to decline. The need for coordination of research and development requires a central source of direction and the struggle over telecommunication policies,a base from which to exert influence on current decision-making.

Research Institute (2)

Passage of S. 1519 without provision for an institute leaves libraries without a mechanism to coordinate the detailed technical planning and research and demonstrations which the National Advisory Commission on Libraries recommended as essential to the development of a national library system. The need for an institute is well recognized. And a strong network development program should be initiated now, if at all possible. This may be an extention of an existing program, such as the Institute for Library Research. Or an entirely new program may be desirable with the primary objective to direct research on problems of automation and telecommunication associated with networking.

In my opinion a private effort would have advantages at this time.

over a government activity. Many of the reasons listed earlier in support of a nongovernment corporation apply. But a primary reason is the greater possibility today for a private entity to raise adequate funds; that is if a favorable opinion supports this goal.

The establishment of the National Commission on Libraries and Information Sciences does not leave groups totally free to take leadership in developing a private institute, even if it were regarded as timely. Yet all initiative should not be surrendered. Had Congress felt a government institute for libraries was desirable it could easily have followed the recommendation of the advisory commission. And the President has omitted any reference to it in his messages.

It would be ill-advised to establish an institute without positive interest by the Executive Office of the President and the new National Commission. However, the necessary agreement of leading private groups and the assurance of private funding should be explored.

Some assurance of minimum backbone financial support for as much as five years is essential to independence and to pursuit of long-term objectives. At the end of such a period new approaches may be needed.

Establishment of an Institute for Libraries and Information Systems would provide a problem-solving base for continuing communication between the many interested groups which must eventually be a part of a national information system development.

Action Center (3)

Issues which ultimately effect the cost of telecommunications and the access of libraries to users or to other libraries are determined at a number of points: municipal agencies, state commissions, the Federal Communications Commission, General Services Administration, Interagency Radio Advisory Committee, and the Congress of the United States.

As potential users of state networks, urban cable systems, and satellite interconnections libraries have basic interests in these determinations. Some attempts to create a favorable telecommunication environment for education have been described. A laissez faire approach with occasional appeals for united action cannot be effective over such a broad and complex front. While one can properly advise that the local library director lead a fight for public channel concessions at a cable franchise hearing, to base national development entirely on the separate actions of hundreds of independent institutions is not likely to assure full exploitation of opportunities or a uniformly high level of access to new telecommunication systems.

Latecomers to the spectrum regulation game are at a severe disadvantage and have difficulty in demonstrating effective use without experience to fall back on. They have much to learn and because of the volatile character of telecommunications today must learn it quickly. Most decisions are made on the basis of arguments presented by self-declared parties of interest. Basic application patterns for the new transmission technologies will be set over the next five years and most often in response

to the "squeaky wheel."

In bringing to bear the requirements of libraries for telecommunications, no behavior coming from within government can substitute for strong, organized citizen action outside government. A small investment in an action program now could produce important dividends for libraries, far in excess of the investment.

A National Action Center could be organized with the function of creating a telecommunication environment favorable to the growth of information networks. As a private entity it could move easily at all levels of government and have a general maneuverability which government agencies lack. It would be designed for effectiveness in adversary relationships and would be a source of information and support to local libraries. While drawing on the expertise of the library profession, it should be regarded as independent of the profession and backed by citizens of national stature.

Finance Study (4)

I have been impressed in my reading with how little attention appears to be paid to the matter of Federal financing. The opposite side of the coin, control of costs, is often considered.

There is agreement that an increased proportion of funding must come from Washington. In the past decade the Federal programs for libraries followed the general pattern for the new health and education programs. Categorical programs for construction, research and development,

professional improvement, and services were broken down by classes of institutions and populations to be served. No steady-state network system is possible under an extension of existing funding patterns.

Financing a national network system involves much more than the costs of technology and its operation. Large scale exchange of materials between independently supported institutions is not workable when it drains the haves to support the have-nots. Already there is some strain on that point. What will happen when natural barriers to interlibrary loan requests are at a minimum?

Is a national library system based on networking possible without Federal financing to support the performance of that mission? Library cooperation and networking can develop to a certain degree along market lines. I am told that some libraries today are charging fifty cents a page for Xerox copies, which serves to control demand and return costs. Methods which work today, however, may not work well when many of the natural inhibitions to circulation are removed by automation and networking with resulting increase in loan traffic. With networking the day would be passed when the library director could personally approve all responses to loan requests, as has been the case even in some very large libraries.

Ideally the pattern of funding for a national system should promote the achievement of primary objectives. The Carnegie Commission on Educational Television recommended a plan which reinforced their principal concern, insulation from political influence. One form of library funding might be geared properly to encourage the collection and circulation of

materials.

A Federal funding program for the support of circulation could not be developed without a much clearer picture of operating costs. There are enormous difficulties in the way of cost accounting as is made clear in the paper on library operations costs prepared for the National Advisory Commission on Libraries. Adequate information is lacking and may never become available in ideal form.

Something approaching a market situation might nevertheless become workable. Perhaps it will be as simple as a federally supported fund for reimbursement of national circulation, with libraries drawing payments from the fund for library loans, based on a schedule which would allow a "profit" over actual operating costs.

Obviously, careful study of many alternatives is required. A serious approach to networking cannot neglect the subject of financing. Such a study involves the whole of the library and information service enterprise. Reliance on the present Federal patterns of block and formula grants or committee approved special grants is not conducive to system growth and operation.

It is not realistic to expect rapid interlibrary loans, improved reference service and the direct distribution of some kinds of materials, which would be the consequence of networking and automation, without great changes in the flow of materials and in the cost structure for the libraries involved.

The findings of the study should include recommendations for Federal

financing designed to increase information opportunities for the user. These could remain in the wings awaiting an appropriate opportunity and would be insurance against a program of library funding constructed from general formats by an overworked legislative staff of the U.S. Office of Education during the midnight hours.

Maintaining Momentum

There should be no let up in exploring the application of telecommunications to library services. "A program of action" prepared for the National Advisory Commission and included in Libraries At Large (Chapter VII) advises, as an approach to technological development in the foreseeable future, a process of identifying and supporting selected "high impact" activities. I would like to add some candidates to the list. These have particular relevance to the future application of telecommunications and reflect events, referred to here, which have occurred since the preparation of that program.

-- Urban networks (5): What, if any, will be the effect of the wired city on libraries? A multi-discipline study group with strong representation from urban libraries might examine the implications to libraries of cable systems and project feasible applications. The opportunity would be provided for conceptual meshing of urban library policies and operations with the technological potential of the wired city system. Such a study should be pursued in enough depth and be given enough dissemination to perform a function in national and local

wired city decision-making proceedings. It seems unlikely that a pilot library project involving cable systems could be successfully initiated for some time. However, the need for such a project should be recognized, the necessary conditions set forth in the study so as to lay a basis for future industrial and foundation assistance.

-- Statewide Networks (6): The planning of library services using statewide telecommunication networks might be funded in selected states. Superior effects would merit further funding for the preparation of detailed plans. If warranted, and if the necessary technical and organizational conditions existed within the state, the future funding of a few demonstration projects might result. It is evident that even a single demonstration would be very costly if carried over a period of a few years and should be undertaken only if there is promise of extending proven practices to other states.

-- National Prototype Projects (7): The three national libraries should receive the active support of the profession in efforts to mount national network demonstrations. The National Library of Medicine has developed plans for a national health system. It may be possible that this could be linked to an industrial application for a communication satellite system. The National Agricultural Library and Educom are jointly developing plans for a university network. The Library of Congress looks to an automated national network based upon the library's developing automated central bibliographical system.

-- A Satellite Strategy (8): Libraries should actively participate

in all efforts to extend the principle of free or low cost rates for education. This particularly applies to actions under existing statutory language. But it applies also to organized efforts to use the opportunities afforded by requests to the Federal Communications Commission for authorizations to operate communication satellite systems.

-- National Network Forecast (9): There have been several national network models prepared which would serve particular information objectives. No national development schedule based on alternative priority arrangements has been attempted and it may well be impossible. However, without making explicit the costs, benefits, manpower needs, and general operating requirements for alternate methods to meet the nation's information needs, it is difficult to begin to arrange the political, financial and operational conditions necessary to future development.

In the interest of favorable support it is desirable to reduce internal conflict which may weaken confidence. A plan of development which recognizes all legitimate needs and proposes to accomodate them at some point in the future can serve as a basis for unified effort. The good sense of having such information available is clear, but the extent to which it is feasible to get it is the question.

NETWORKS AND THE FEDERAL ROLE, A PERSONAL VIEW

The sad truth is that there are many unresolved problems standing in the way of a national system of library telecommunication networks.

Certainly we have reached the point, however, where a more orderly, more coherent, and more effective approach to the development of information systems should be considered.

A number of important efforts such as that by the National Task Force on Automation and other Cooperative Services are clearing away the problems relating to messages.

Yet the status of telecommunication development -- statewide networks, urban cable systems, national prototype projects -- provides no assurance that the normal progression of events will accommodate the probable future needs of libraries. The impression is quite the contrary.

Nor does the commendable growth in sharing between libraries, documented elsewhere, give us assurance that lacking greater direction these separate cooperative programs will inevitably evolve into a well-integrated and equitable national library network.

A new level of activity is needed, broader in scope, more coherent in plan and with much greater involvement by the public and private forces in the field.

Development of library use of telecommunication networks can be viewed in two phases: creation of the essential conditions, involving an array of actions over the next five years, and initiation and expansion of a steady-state national system sometime thereafter. The earlier phase would use existing Federal resources augmented by foundation aid and encompass programs of research and development to solve technical and operational problems, programs of public action to shape government policy so as to

permit educational application of telecommunication, and the development and authorization of a steady-state plan. The later phase would demand an entirely new level of Federal financial support and new operating and management mechanisms. Throughout, the power of the Federal government would be paramount.

A principal question in the course of future development is the desirable role to be assumed by the Federal government. Stated another way, what are the limits to be placed on Federal action in this area of individual communication?

A second major question concerns the nature and goals of private organized effort. The resources of government will be captured only with the help of organized activity outside government. Only with private action can the environment created by government practices, such as the regulation of cable systems, be successfully modified to allow for optimum library network development. Organized private action will be required also if developmental and financial roles of government are to be expanded.

In considering national library and information networking, I think we can easily underestimate the problem. The present library system is representative of an earlier era of more or less autonomous units serving clusters of people, with relationships between units tending to be personal as much as institutional.

We are considering marrying this highly autonomous library system to library telecommunication networks which require a great amount of integrative behavior with consistency and conformity by participants. In the

process the problems also change from those determined locally essentially, or within the institution, to problems which require national solutions and national mechanisms to implement solutions.

As far as libraries are concerned, telecommunication networking is not simply one more technical advance. A functioning network heralds the entry of the library into the industrial age. A national network requires central planning and control of the elements needed to assure function of an apparatus which is a national instrument and yet made up of parts which continue to reflect local needs.

We will observe a process which has been repeated many times during the industrialization of the nation, the application of technology to hand methods resulting in increased availability of services. It is a process also in which the small unit often fails or is merged with the larger unit.

The term "network" can signify many forms and degrees of cooperation. To achieve major goals of the National Advisory Commission, one can envisage a national library network system made up of regional or state library network systems. Essentially all locations are provided with access to information on total national and international holdings and access within prescribed limits to the materials contained in the total holding. Telecommunications in this national library system are used routinely for cooperation in acquisitions, technical processing, organizing and maintaining library collections as well as in sharing resources to meet service demands and in providing access to the total national store.

It is a system that uses state or regional telecommunication networks for rapid response and urban cable systems for convenience to the client.

If this, or something approaching this, is a goal, the library will have to increase institutional power. Organized control will be required over far more of the surrounding environment.

A working telecommunication network demands more than a will to cooperate between entities. Sufficient control over the future is required to provide adequate financial resources, enlightened regulation, sound technology, operational competence, and effective articulation with user needs and habits. A national library system will be able to plan cooperative action and exercise the control needed to apply the plans and measure results, these powers are nonexistent in today's laissez faire system.

Evidence of the importance of central control in the operation of telecommunication systems are the two most effective operators today, the telephone company and the U.S. government. As John Kenneth Galbraith in the New Industrial State points out, a major factor in the progress and low cost of telephone service in the United States has been the dominance by comprehensive planning at all points of the system. By way of contrast he points to the poor performance of U.S. mass transit systems where government policy has precluded central direction.

The military so entirely controls their communication environment, even including the spectrum, that they, as users of communications, can define their requirements and provide a market incentive for industry to solve the problem. The needs for communication go in search of the

technology.

In sharp contrast we have technology in search of needs to which it can be applied. This characterizes industry's relationship to education today. The laissez faire library system with its small independent units is the kind of terrain suited to the familiar U.S. marketing habits: controlled obsolescence, flashy outer garments and the smallest possible change in existing designs to meet special requirements. Often today, adoption of technology seems to take the form of entrapment, with libraries and others understandably cautious about committing themselves to particular equipment when the decision may dictate future choices for sometime to come.

Experience surely suggests that the operation of a national library telecommunication network will require strong central operating controls. To date no operating national telecommunication network has been established outside the market economy except with firm Federal direction.

The greatest obstacle in the way of system development according to Nelson Associates is the library's fear that autonomy will be lost. The library has a number of protections, anchored as it is to a host institution, dependent on local funding, public and private, and protected under state and local statutes. Yet the effect of a national service on local autonomy is a question that cannot be set aside. How can we construct and gain operational effectiveness for a coherent set of national objectives and practices while at the same time preserving as much as possible the ability of individual library units and small systems to adapt to the

special needs of their community? An answer must be found to satisfy the individual library if it is to agree to participate in national networking.

Traditionally the Federal government has used the taxing power and gained conformity of the smaller unit through financial inducements. Networking will result probably in greater library operating costs, the formula being increased access equals increased circulation equals greater costs. While libraries as agents of host institutions will continue probably to receive major support from the budgets of their hosts, national networks will surely require increased Federal support to libraries.

Federal control of operations need not be a price for additional Federal support, however; three private communication corporations established over the last decade by government action are recognition the the superior tax power of the Federal government is not to be equated with superior administrative capacity.

On the other hand, Congress has every right to know what it is receiving for expenditures to weight them against other demands. Measures of performance now lacking become a necessary tool to protect management freedom. We shouldn't expect Congress to provide resources without evidence of responsible use.

It is said that since libraries do not determine content as in the case of television there need be little concern over government influence. Yet libraries do determine access to information. Access can be influenced indirectly by apathetic administration, adherence to old processes, failure to understand the needs of the users, and it can be influenced directly

by funding priorities. For different reasons the question of Federal control is as real for libraries as it is for the mass media.

Our problem is to produce a system of funding which serves a creative purpose and does not suppress the very function which it is designed to perform, namely to increase availability of relevant knowledge.

If the Federal government were to manage a national library network there would be, it seems to me, some danger that the system would respond best to knowledge requirements growing out of the directions and purposes of established bureaucracy. The Federal government is not only a source of finance it is an interested party. It includes within its house a great many information users and library institutions. Can any of these honestly speak for the varied needs of the general citizen? The special functions of government -- economic development, social control, scientific growth -- will receive emphasis while the general needs of man for knowledge to control himself, his environment, his society and his nation will face a subtle neglect. Will the needs of science and technology for which the Federal government provides large resources be emphasized over the humanities and the arts for which the Federal government provides only the smallest token of assistance?

The power of the Federal government needs to be offset by solid increases in organized power and initiative outside government.

Increase in power outside government is desirable for a second reason. It is usually overlooked that a national library network would not be supported by a market economy out of which steam for development can come. Libraries

have been told to imitate the network practices of industry. Unlike industry, there are no profits for libraries to be generated with expanded networks. If anything, networks may produce losses when used to increase circulation of materials, unless they are linking units of a single central system.

What source is to supply the steam? In the absence of a market economy the only power available for advancement of a national pattern of networking is the national government. How is the Federal power to be evoked? We have observed examples of presidential leadership, foundation leadership, and pressure from science and industry, each seeking to link Federal powers to development of a network. What will constitute a sufficiently powerful motivating force to support such leadership? Nothing less, I suggest, than the combined forces of those who would benefit -- industry, government, the information using disciplines, the citizen, joined by the private foundations and the library professional -- all sharing in a campaign of program planning and persuasion.

I would dispute those who think the national climate to be poor for advancement. There is good reason for the national administration to turn a friendly hand to the improvement of libraries and information services. With recent appointments there are within the Executive Office of the President unusually strong abilities in the area of telecommunications. The administration furthermore, has rather successfully challenged the highly centralized character of our mass media. It has been met with the charge that its attack, far from representing a concern for the

citizen's access to all kinds of opinion, is exclusively concerned with its own public exposure. There could be no such confusion in the promotion of libraries as the communication medium which provides full and free access to the opinions of the world.

Perhaps out of this conference can come a temporary steering committee made up of individuals with experience and ties representative of the many facets and interests touched by a national program for information system development. Such a group could lay the basis for a more comprehensive and solidly based approach to the problem and assure that the momentum of this conference will not be lost.

FOOTNOTES

1. Lacy, Libraries at Large, p. 12.

2. The International Telecommunications Union is an agency of the United Nations. The definition is that approved by the Union.

3. U.S. Office of Education, Libraries at Large, chap. XI, p. 481.

4. U.S. Office of Telecommunication Management, "Significance of Technical Trends in Telecommunications," 22 Jan. 1968.

5. Lyndon B. Johnson, Public Papers of the Presidents, "Special Message to the Congress on Communications Policy," 14 Aug. 1967, p. 763.

6. President's Task Force on Communication Policy; Report, chap. IX, pp. 2-7.

7. National Advisory Commission on Libraries, Libraries at Large, chap. XII, p. 518.

8. U.S., Congress, House, Committee on Education and Labor, Committee on Instructional Technology, To Improve Education, p. 45.

9. President Richard Nixon, "Message on Educational Reform to the Congress of the United States," 3 March 1970.

10. Lyndon B. Johnson, Public Papers of the Presidents, "Remarks Upon Signing the Public Broadcasting Act of 1967," p. 996.

11. President's Task Force on Communication Policy: Report, chap. V, pp. 14, 17, 36.

12. Peter Flanigan, "Memorandum for the Honorable Dean Burch, Chairman of the Federal Communications Commission from Peter Flanigan, Assistant to the President," 23 Jan. 1970.

13. State of South Dakota, Communication System Planning for the State of South Dakota, p. 25.

14. State of Illinois, Telecommunication Study, Report C, p. 82.

15. Electronic Industries Association, Comments on Docket No. 18397, Part V, p. 20.

16. U.S. Office of Telecommunications Management, "Significance of Technical Trends," p. 51.

17. Dean, "Hitches in the Cable," Nation, 20 July 1970, p. 45.

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